

Rearticulating Internet Literacy

Bauer, Alfred Thomas; Ahooei, Ebrahim Mohseni

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Bauer, A. T., & Ahooei, E. M. (2018). Rearticulating Internet Literacy. *Journal of Cyberspace Studies*, 2(1), 29-53.
<https://doi.org/10.22059/jcss.2018.245833.1012>

Nutzungsbedingungen:

Dieser Text wird unter einer CC BY-NC Lizenz (Namensnennung-Nicht-kommerziell) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier:
<https://creativecommons.org/licenses/by-nc/4.0/deed.de>

Terms of use:

This document is made available under a CC BY-NC Licence (Attribution-NonCommercial). For more Information see:
<https://creativecommons.org/licenses/by-nc/4.0>

Rearticulating Internet Literacy

Alfred Thomas Bauer
Ebrahim Mohseni Ahooei *

(Received 19 November 2017; accepted 16 January 2018)

Abstract

As a simple explanation, Internet literacy is a capability constitutive to utilizing the advantages of the Internet. But, due to the constant changes of digital technologies, what kinds of necessary capabilities are required to gain the advantages? In fact, more than focusing on the essential capabilities to benefit users from the Internet advantages, existing perceptions of Internet literacy have caused the misuse of large digital companies from users' abilities. Due to the increasing importance of data economics, privacy, and cybersecurity, a critical review of Internet literacy has become a necessity. Based on the emerging of such new critical features of internet environment, this paper proposes a new articulation of Internet literacy. Following a review and analysis of the existing notions and classifications of Internet literacy and using grounded theory method, the article concludes by suggesting a rearticulated version of Internet literacy. The new classification is established based on the 3 main components including responsibility, productivity, and interactivity; 9 main categories, and 43 subcategories. The four critical, analytical, operational, and informational crossover components are also taken into account.

Keywords: Internet literacy, responsibility, productivity, interactivity.

Alfred Thomas Bauer: Institut fuer Publizistik und Kommunikationswissenschaft, Universität Wien, Österreich- Email: thomas.bauer@univie.ac.at

Ebrahim Mohseni Ahooei: (corresponding author). PhD Student, Department of Communication, University of Vienna, Austria and Senior Researcher at Cyberspace Research Policy Center, University of Tehran- Email: emohseni@ut.ac.ir

Introduction

Literacy is not isolated from its social context (De Castell and Luke, 1986). Every changes in social context lead to a change in the concept and nature of literacy (Gee, 1996). Internet literacy has also a close relationship with participation in cyber-culture (Lankshear and Knobel, 2006).

Theoretically, the pedagogy of Internet literacy can lead to the more capabilities to benefit from the advantages of the Internet. But, what kinds of capabilities will lead to the assumed benefits from the advantages? So, the critical question is what is this thing called Internet literacy? Does it just embed in a set of skills and knowledge to conduct online operations? Reducing the concept of literacy to some technical capabilities (as many existing formal definitions show) neglects the importance and necessity of critical, creative, and cautious understanding, using, producing, and release data, information, and digital contents on the Internet. Increasing enhancement of online abuse (for example see Parker et. al, 2008; Müller, Röder & Fingerle, 2014; Michael, 2016) and endangering the benefits and rights of users (Rubin & Lenard, 2002; Leadbetter, 2009; Koren, 2014; Acquisti, John, & Loewenstein, 2013) are the serious warnings to address the necessity of redefining Internet literacy.

The purpose of this article is to take a critical and conscious approach to the Internet literacy along with other essential skills and providing a more explainer and efficient articulation of Internet literacy. With the aim of explanation and analytical articulation of Internet literacy, this article begins with a review of the literature on Internet literacy and discusses prior studies on theoretical or analytical models of Internet literacy. Then, the data provided from existing definitions, classifications, and models are categorized and analyzed to construct an innovative articulation to provide both explanation and analytical functions.

Literature review

It is a simplistic idea that reduces internet literacy to the mere ability to use digital technologies, because the concept of literacy covers a divers set of capabilities, skills and knowledge (Cope and Kalantzis, 2000). In fact, Internet literacy as a concept has a long contentious (Livingstone, 2004). A comprehensive definition defines Internet literacy as the knowledge, skills, and behaviors used in broad range of digital devices such as smartphones, tablets, PCs, etc. (Julien, 2014). Each of the three dimensions mentioned in this definition regards to a level of ability:

Knowledge refers to information, skill refers to the potential for working with tools, and behavior refers to the actions.

In addition to this comprehensive macro definition, many other scholars have interestingly focused more on the concept of ability in their definitions. They have mentioned capabilities like the ability to access, analyze, evaluate, understand, create, and produce (Aufderheide, 1993; Livingstone, 2004; Potter, 2010); critical and creative abilities like critical reading, creative production, and critical understanding (Bukingham, 2007); the ability to locate, evaluate, manage, and effectively use (Farmer & Henri, 2008); and knowledge for interpreting and evaluating (Banta & Mzumara, 2004).

Beside of the definitions of internet literacy itself, there are also a set of synthetic concepts resulted from the combination of 'literacy' and other concepts derived from media and Internet fields, include media literacy, computer literacy, technology literacy, cyberliteracy, digital literacy, web literacy, network literacy, e-literacy, information literacy, data literacy, and social media literacy which their components and criteria are also applicable to Internet literacy.

This study is based on the analysis of a collection of well-known existing approaches and definitions of Internet literacy and other related literacies in terms of skills similarity, as well as approaches on the skills necessary for the future of the Internet. The collection consists of 35 different approaches to Internet literacy and related literacies, 42 lists of internet skills, subsets of definitions or independent of them, and four well-known and popular academic classifications of Internet literacy.

Table 1. Results from comparison approaches to literacies related to media and Internet

Internet literacy	Internet literacy is the ability to access, understand, critique, and create information and communication content online (Livingston, 2009; Livingstone, Bober & Helsper, 2005; Van Deursen & Van Dijk, 2009, 2010, 2011) while incorporating the following three points: (1) the ability to address illegal and harmful contents on the Internet appropriately, (2) the ability to communicate on the Internet appropriately, and (3) the ability to protect his/her privacy and perform security measures (Fuji & Yoshida, 2015).
-------------------	--

Media literacy	Media Literacy is the ability to access, analyze, evaluate, and produce communication in a variety of forms. In essence, a media literate person can think critically about what he/she see, hear, and read in books, newspapers, magazines, television, radio, movies, music, advertising, video games, the Internet, and new emerging technology (Kaiser Family Foundation, 2003; Livingstone, 2004; Martin & Grudziecki, 2006).
Computer Literacy	The ability to use a computer and its software to accomplish practical tasks (Haigh, 1985; Tobin, 1983).
Technology Literacy	Technology literacy is the ability to effectively and responsibly use appropriate technology to communicate, solve problems, and access, manage, integrate, evaluate, create, and communicate information to improve learning process through problem-solving and critical thinking (Estes, 2015, 2017), and to be able to critically evaluate the accuracy and currency of the information obtained and integrate it in the synthesizing of new information (Nicholas and Ng, 2009; Farmer, 2011), the aptitude to use media, such as the Internet to access and interact with information (Golian-Lui & Westenkirchner, 2011) for future progress (Sedivy-Benton, 2016), and to acquire lifelong knowledge and skills in the 21st century (State Educational Technology Directors Association, 2007).
Cyberliteracy	The ability to use computer technologies effectively and to simultaneously understand the implications of those actions. It is also important to know where to go to find reliable and accurate resources in cyberspace (Gurak, 2003).

Digital literacy	Digital literacy is the awareness, attitude and ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers (Gilster, 1997: 1; Martin & Grudziecki, 2006: 7), it is more than just the technical ability to operate digital devices properly; it comprises a variety of cognitive skills that are utilized in executing tasks in digital environments (Eshet-Alkali & Amichai-Hamburger, 2004), a person's ability to perform tasks effectively in a digital environment... Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments (Jones-Kavalier & Flannigan, 2006).
Web literacy	Web literacy comprises the skills and competencies needed for reading, writing and participating on the web (Chung, Gill & O'Byrne, 2017).
Network literacy	Network literacy is an emerging digital literacy that deals with computer network knowledge and skills. Network literacy relates to the basic knowledge and skills required for citizens to participate in the networked society (Scottish Qualifications Authority, 2014; Fabbro, 2009) or basic knowledge of how networks can be used as a tool for discovery and decision-making, and about both their potential benefits and pitfalls, made accessible for all people living in today's networked world (NetSciEd, 2017).
e-literacy ¹	E-Literacy relates to the skill set required to make efficient use of all of the materials, tools, and resources that are available online (Halvorsen, 2009: 254).

Information literacy	Information Literacy is defined as the ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand (National Forum on Information Literacy, 2017; Association of College and Research Libraries, 2000: 2; Eisenberg, Lowe & Spitzer, 2004) in an ethical manner (CILIP, 2004).
Data literacy	The ability to read, create and communicate data as information and has been formally described in varying ways (Na & Yan, 2013), knowing what data is appropriate to use for a particular purpose, interpreting data visualizations, thinking critically about information yielded by data analysis, recognizing when data is being misrepresented or used misleadingly, understanding data analytics tools and methods and when and where to use them, and communicating information about data to people lacking data literacy, an ability sometimes referred to as data storytelling (Rouse & Wigmore, 2015).
Social Media literacy	Social media literacy is the ability to access to social media applications, the knowledge, skills, attitudes and self-efficacy of individuals to (appropriately) use social media applications and to analyze, evaluate, share and create social media content (Vanwynsberghe, Boudry & Verdegem, 2011).

Besides of these definitions which contain some necessary components of Internet literacy, many of these synthetic concepts have been associated with some sets of skills² which contain more developed components and categories.

As the listed components and criteria of the Internet and other related literacies shows, the presented classifications are limited to just some kinds of technical or operational and information skills. Many other skills, for example, related to awareness, cognitive, creative, management, participative, and collaborative skills, are not included in such classifications. In fact, they are a simplified categorization of skills

which were used to assess the relative Internet literacy in the past. According to the recent significant advances in Internet area, we are faced with a new situation and this new situation demands new Internet literacy skills and requirements.

On the classifications in the field of Internet literacy, a distinction between Internet skill literacy and Internet information literacy is made in the study of Kim and Yang (2016) on civic engagement. They define Internet skill literacy as “conceptually parallel to access. It relates mainly to the set of basic skills required to use Internet technology, including the ability to navigate hypermedia environments,” while Internet information literacy refers to “one’s ability to sift through information to achieve certain needs” and “often involves searching, collecting, understanding and evaluating content” (Kim and Yang, 2016: 442). van Deursen, van Dijk, and Peters (2011) also used such a distinction between Internet skill and Internet information and show Internet skill literacy increases by the level of Internet usage and Internet information literacy increases with age. In another work, van Deursen and van Dijk (2010) classified Internet literacy into two components: Medium-related Internet skills (contains operational and formal skills) and content-related Internet skills (including information and strategic skills).

Steyaert (2002) also classified digital literacy into three separate skills: Instrumental skills, structural skills, and strategic skills. Based on Steyaert classification, Van Dijk (2005) also classified digital skills into operational skills, formal information skills, substantial information skills, and strategic skills.

In another classification, Farmer and Henri (2008) have divided Internet literacy to seven dimensions include tool literacy, resource literacy, social structural literacy, research literacy, publishing literacy, emergent technology literacy, and critical literacy. Although this type of classification provides some analytical problems, but the distinction between skills and critical understanding is significant as it can clarify the distinctions between operations and information and between medium and message (Kim, 2011; Tyner 1998).

The phrase ‘Instrumental skill’ in Steyaert (2002) is equivalent to the phrases ‘Operational skills’ in Van Dijk (2005), ‘Medium-related Internet skill’ (both operational and formal) in van Deursen and van Dijk (2010), and ‘Internet skill literacy’ in Kim and Yang (2016). Also, the phrase ‘Structural skill’ and ‘strategic skill’ in Steyaert (2002) is equivalent to the phrases ‘Formal information skills, substantial information skills, and strategic skills’ in Van Dijk (2005), Content-related Internet skills (contains information and strategic skills) in van Deursen and van Dijk

(2010), and 'Internet information literacy' in Kim and Yang (2016). There is an evolutionary sequence between these classifications.

Table 2. The most referred Internet literacy classifications

Author(s)	Component 1	Component 2
Steyaert (2002)	Instrumental skills (the operational manipulation of technology)	Structural skill (related to the structure in which information is contained) and Strategic skills (proactively looking for information, information-based decision-making, and scanning for relevant information)
Van Dijk (2005)	Operational skills	Formal information skills, substantial information skills, and strategic skills
van Deursen and van Dijk (2010)	Medium-related Internet skills (operational and formal skills)	Content-related Internet skills (information and strategic skills)
Kim and Yang (2016)	Internet skill literacy	Internet information literacy

All of these definitions and classifications are helpful to make our theoretical and analytical model of Internet literacy, although we argue that these are necessary but not sufficient components for Internet literacy and ask, how far is it possible to adapt what we know of Internet literacy in order to make a scholarly model for new aspects of Internet literacy in increasingly changing Internet environment?

Methodology

This study uses grounded theory, whereby the field is approached without a preformed theory. Grounded theory is also especially suitable for the 'abductive reasoning' (Peirce in Burks, 1978) pursue here. The stimulus for the research is to discover and classify the components of Internet literacy in an analytical map. The objective of the research is to understand and characterize the aspects of Internet literacy with no prior commitment to any particular theory.

Grounded theory as a qualitative method is introduced by Glaser and Strauss (1967). The main aspect of the grounded theory is that instead of the data collection being based on an existing theory, the gathered data is used to generate the theory (Strauss & Corbin, 1998). In grounded theory, data collection and explanation are performed in parallel, and the material is then used to generate the final explanation (Patel & Davidson, 2011 cited in Eriksson and Reinsjö, 2016).

In a review of the history of the method, McCallin (2004) point out three different versions of the grounded theory. These include the classical version (Glaser & Strauss, 1967), more structured approach (Strauss & Corbin, 1998 cited in Denzin & Lincoln, 1998), and social constructivist version (Charmaz, 2006). This study conduct based on social constructivist version of grounded theory.

Charmaz in introducing social constructivist grounded theory argues that theories do not emerge from the data, but they are constructed by the researchers through the process of research (Charmaz, 2000, 2002, 2006). In this view, the researcher does not receive social reality by using grounded theory; but, it is a construction of reality (Charmaz, 1990). This research is conducted based on the social constructionist version of the grounded theory. Charmaz (2008) stated that her method is rooted in social constructionism. She explains her prefer from two perspectives: Neither data nor theory is discovered but constructed by researchers in the process of research and that any theoretical explanation of social phenomena is not an exact picture of the world but an interpretive one (Charmaz, 2006). This is more correspondent with a realist view since all scientific products are socially constructed and thus non-neutral (Bhaskar, 1975) and is more applicable for this study as the investigated phenomenon here is also a social constructed.

This article is based on analyses of the most referred and well-known definitions and classifications of Internet literacy and its associated concepts from media and Internet fields, include media literacy, computer literacy, technology literacy, cyberliteracy, digital literacy, web literacy, network literacy, e-literacy, information literacy, data literacy, and social media literacy. Categorization, encoding, and classification of the data are proceeded by the Atlas.ti, a qualitative analysis software. This software is especially efficient for conducting the parallel analysis conducted here. Through the process of reading, each definition and classification entered in the process of 'open coding,' based on Corbin and Strauss (1998). These codes then are collected into the axial coding. The axial coding enables the researcher to make

the linkage between categories. This linkage should be in a meaningful way. As in grounded theory categories emerge from the data and they are not mutually exclusive and they evolve throughout the research process (Willig, 2013), we conducted open coding and axial coding in a repeating process. We used the constant comparative analysis strategy (Willig, 2013) to identify categories, make links between categories and establish relationships between them.

The process generated by analyzing definitions and a list of skills related to a broad set of concepts, and therefore the level of analysis in this study is concepts. The coding process began after entering all the concepts into the Atlas.ti. In the process of coding, the identical concepts were merged into each other and, conversely, if a particular concept implies more than one subject, that concept was decomposed into two or more separate concepts.

In addition, the concepts entered into the software as raw data suggested four distinct categories. The design of the quadrilateral relationship between the concepts was one of the main challenges of classification. Three times classification of concepts and testing the structure in terms of self-sufficiency and non-overlapping, eventually proposed a specific structure, based on which three distinct levels and a crossover dimension were separated. At the first level, a collection of 43 sub-categories was arranged in the final construction in the infinitive form (with the suffix “ing”). Then, in the classification process, each of these sub-categories was classified in one of the nine main categories (in the noun form). At this stage, a distinction between the main categories was the most important point. In the third phase, all major categories were classified into 3 main components which designed in the adverbial terms. The crossover dimension also designed to show analytical, critical, operational, and/or informational aspect of every sub-category.

Towards rearticulating Internet literacy

Our goal in this paper is to design an analytical articulation of Internet literacy components. The articulation should theoretically explain various aspects of Internet literacy as a map and also analytically provide a usable toolkit for evaluating and assessing the level of Internet literacy. The basis for this new articulation is significant changes in the nature of the Internet, the future trends in the development of the Internet, the inadequacy of existing articulations, their limited attention to critical dimensions and lack of attention to cognitive dimensions of Internet literacy.

Based on both analytic and theoretical categorizing and revisions

of codes and categories in a repeating process, eventually, 43 axels (in the phrase format) obtained. These axels cover all analytical, critical, operational, and informational skills and knowledge of Internet literacy. The axels (which are encoded at the level of subcategories) then classified into nine main categories. The concepts of these nine main categories directly come from the existing definitions. At the last phase, the main categories classified in three components. Every component refers to one of the main aspects of Internet literacy.

The three main components— responsibility, productivity, and interactivity—together constitute a theoretical approach to Internet literacy, an innovative articulation which tries to has attention not just to technical and informational aspects of Internet literacy, but also diagnostic, practical, behavioral, and ethical aspects. Each component supports the others as part of a dynamic learning process: Learning to responsibility skills helps one to be productive in a more desirable manner and productivity skills expand interactivity.

Before explaining the components, categories, and subcategories raised from axial and theoretical coding, it should be mentioned that based on contextual differentiations, we do not mention any referents of our subcategories here. In fact, in use of our theoretical and analytical model in every specific situation, referents and examples should be determined based on the socio-cultural context. This demand-based approach helps us to keep the universality of our model.

Responsibility

The first component of Internet literacy can be conceptualized as responsibility. This component is about behavioral and normative aspects of Internet literacy. All kinds of moral responsibility (Klein, 2005), social responsibility (Palmer, 1995), professional responsibility (Schneyer, 1992), and legal responsibility (or obligation) (Baudouin, Jobin & Vezina, 2005) are embedded in this component. Based on the meaning of the concept, we define responsibility in the realm of Internet literacy as knowing how to act appropriately online. It is about the awareness and cognition about the online data or information and Internet processes and the ability to apply the relevant issues and the strategies available to support the safe, responsible and ethical use of the Internet. Therefore, three categories of responsibility are awareness, cognition, and application.

Awareness itself is defined as the state or quality of being conscious of something (Cambridge Dictionary, 2017). This concept is just mentioned in the Martin & Grudziecki's definition of digital literacy

(Martin & Grudziecki, 2006), but it is a very useful concept to show the consciousness aspects Internet literacy. The awareness implications for Internet literacy are very different from ethical issues to legal ones. The four subcategories to recognizing awareness are 1) Addressing illegal and harmful contents; 2) Recognizing accuracy and currency of the information; 3) Discerning potential benefits and pitfalls (for her/himself, website, and third parts); and 4) Knowing appropriate data for a particular purpose.

As it is mentioned in the discussions before, based on socio- cultural context, the examples and referents of every axel are different. For example, the harmfulness of a content may be related to some identical components of the user.

Although in some definitions, awareness and cognition are defined similarly, but there is a specific difference between these two concepts. While, awareness is more knowledge based, cognition is a step forward to action as it is more experimental encompasses “communicating, deciding, planning, and problem-solving.” (Lintern, 2007 in Blomberg, 2011: 89). Cognition as a main category of responsibility component includes: 1) Finding reliable and accurate resources; 2) Identifying, honoring, and protecting online rights, responsibilities, and ethics; 3) Adhering to netiquette in interactions and collaborations; 4) Diagnosing when data is being misrepresented or used misleadingly.

And the last category of responsibility component is about the ability to apply the correct decision and behave normatively. It contains two subcategories: 1) Understanding of the relevant issues and the strategies available to support the safe, responsible and ethical use of Internet; and 2) Understanding what means digital citizenship and adhering to the norms of behavior.

Productivity

Productivity simply means “the state or quality of being productive” (Oxford Dictionary, 2017). In the realm of Internet literacy, productivity means knowing which operations, tools, and techniques to use and how to evaluate/ interpret, create, and manage online information. This component divided into three categories: Evaluation/interpretation, creation, and management.

‘Evaluate’ (the verb form for evaluation) is the most used verb in the definitions of digital literacy (Jones-Kavalier & Flannigan, 2006), media literacy (Kaiser Family Foundation, 2003; Livingstone, 2004; Martin & Grudziecki, 2006), information literacy (National Forum on Information Literacy, 2017; Association of College and Research Libraries, 2000: 2;

Eisenberg, Lowe & Spitzer, 2004), and technology literacy (Estes, 2015, 2017). Evaluation as an Internet skill consists of four subcategories: 1) Judging the truth, currency, appropriateness, and adequacy of information and information sources; 2) Testing the credibility and relevance of information; 3) Assessing and interpreting the up to date, quality, and meanings of the information; and 4) Filtering useful information from “noise” i.e., unsubstantiated or unproven information.

Creation is also a well-known component of Internet literacy (see Livingstone, Bober & Helsper, 2005; Van Deursen & Van Dijk, 2009, 2010, 2011). It is also used in the definitions of data literacy (Na & Yan, 2013), social media literacy (Vanwynsberghe, Boudry & Verdegem, 2011), and technology literacy (Estes, 2015, 2017). Creation’s subcategories encompass: 1) Reproducing data and information; 2) Visualizing data and information; 3) Adapting information for a specific purpose; 4) Designing mental and physical representations of digital content; and 5) Using the Internet to demonstrate creative thinking, problem-solving and knowledge construction.

Management is defined in various ways (see many definitions in Prasad & Gulshan, 2011). According to Fayol (1949:2 in Prasad & Gulshan, 2011), for example, “to manage is to forecast and to plan, to organize, to command, to co-ordinate and to control” (p.6). All of these abilities are used in the last category of productivity component. The subcategories of management are: 1) Conducting a rudimentary and preliminary organization of accessed information; 2) presenting findings effectively for audiences; 3) Controlling personal data and information; 4) Maintaining the privacy and protecting security of digital identity; 5) Protecting privacy; 6) Managing online reputation; 7) Predicting and preventing misuse of personal data; and 8) Integrating information to synthesize unique information from multiple sources.

Interactivity

Among the multiple definitions (see Yuping & Shrum, 2002), Rafaeli defines interactivity as “an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions” (Rafaeli, 1988: 111). These transmissions can be conducted between two (or more) persons (P2P), one (or more) person and one (or more) computer (P2C), or two (or more) computers (C2C). Interactivity as a component of Internet literacy is relevant to P2P and P2C relations. The main categories of interactivity component are communication, participation, and collaboration.

Communication is about both technical and information skills. This category contains all competencies needed for using the Internet safely and accurately. Its subcategories include: 1) Accessing and connecting to the internet; 2) Searching, navigating, finding, retrieving, capturing, and storing accurate and aimed information; 3) Performing security measures; 4) Understanding basic principles, purpose, and applications of encoding and decoding in digital content; 5) Safe practicing against viruses and phishing; 6) Anonymizing and digital footprint; and 7) Potency to ask for and get help with both technical and information problems.

We see both participation and collaboration as the necessary Internet skills. Because of the growing trends of the open web, social networking, social media, and socio-cultural and business platforms the importance of these skills has increased continuously. There is different between these two categories in terms of methods, domains, and targets. While the term participation means “becoming actively involved” and “the act or state of participating, or sharing in common with others” (Collins, 2001: 394), collaboration is defined as “working together, especially in a joint intellectual effort to achieve the desired outcome; to cooperate” (American Heritage Dictionary, 2000). In other words, we can see participation as an opportunity for an individual to influence change and see collaboration as multiple interactions involved in some sense of at least a shared goal.

Participation category includes: 1) Contributing web resources to keep the web transparent and universally accessible to all; 2) Giving others access to eligible, accurate, and necessary information; 3) Contributing and finding content for the benefit of others; 4) Creating, curating, and circulating web resources to elicit feedback; 5) Understanding the needs of audiences in order to make relevant contributions to a community.

Collaboration as the last category of interactivity component includes: 1) Sharing, teaching, learning, organizing, and creating in collaborative environments; 2) Working towards a shared goal using synchronous (communicating in real time) and asynchronous (time lag in communication exchange) tools; 3) Developing a set of shared expectations and outcomes; and 4) Communicating a set of shared expectations and outcomes.

These described components, main categories, and subcategories can give a clear big picture of the proposed model to understand the concept and use it as a tool to measure and evaluate Internet literacy. As we deliberately have refused to mention concrete instances, based

on context-related situations of criteria, this model can be used in every cultural and social context.

Before presenting the model, we should mention two other significant issues. The first one is about our findings on the impossibility of separating skills to operational/ informational skills. Although, it is not unusual to separate these two components in many studies on Internet literacy (Livingstone, Bober & Helsper, 2005; Van Deursen & Van Dijk, 2009, 2010, 2011; Fuji & Yoshida, 2015), but we recognized an excessive overlap between these two components. There are some rare subcategories which are related to just one of these two components, but the operational and informational aspects of the most subcategories are correlative. Thus, splitting Internet literacy to these two part, not only does not help to understand the concept but also makes a lot of problems in the real evaluation of Internet literacy of a user or a society. In the process of axial coding also, we made a crossover articulation based on four new components: Analytical, critical, operational, and informational. These new crossover components are not mutually exclusive. Thus, there are some subcategories which can be classified under every two or more crossover components. Adding these four crossover components emphasizes the characteristic(s) of each subcategory.

To designing the present articulation, three different approaches to Internet literacy have been considered. In the civic responsibility approach (Mascheroni, 2013; Murru, 2013; Coleman and Blumler, 2009), the cultural and social context of the Internet is taken into consideration. This approach addresses internet literacy in relation to civic literacy, which has defined as the ability to access, analyze, evaluate and create a civic culture in the cultural, symbolic, and material forms (Mascheroni, 2013). The lack of attention to the social cultural context is one of the main weaknesses of the existing definitions of Internet literacy. We especially consider the analytical and critical dimensions of Internet literacy to be strongly linked to the civil responsibility approach.

On the other hand, the functional approach (Eshet-Alkalai, 2004, 2005) that is more relevant to the practical and technological aspects of Internet literacy has also been considered in the current articulation. Most of the definitions of Internet literacy can be categorized in this approach, but, nevertheless, the list of technological skills in the available definitions shows a defect. Combining the list of skills mentioned in the existing definitions and analyzing the prospective approaches to the Internet technologies will provide a more complete set of skills in our articulation.

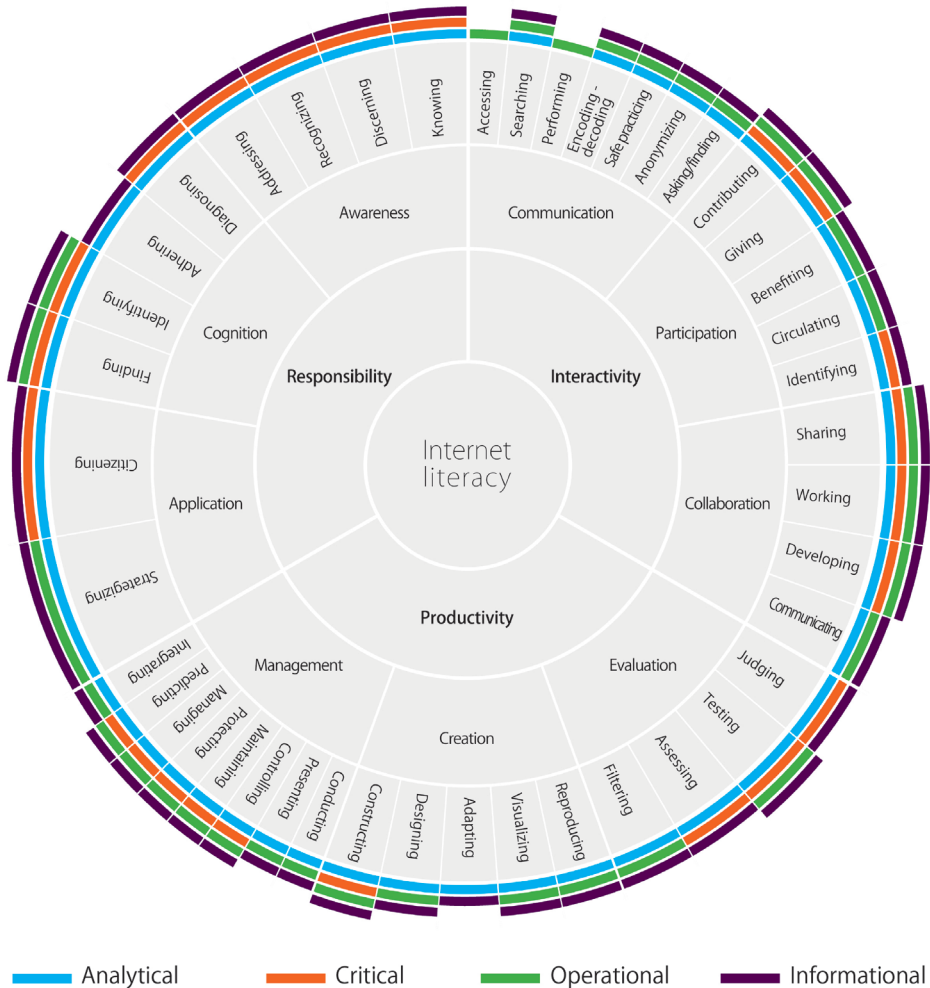


Figure 1. The Internet literacy map
(subcategories in the form of infinitive are representatives of their phrases presented in the text)

Finally, the cognitive approach to the Internet literacy (Amichai – Hamburger, 2000; Amichai - Hamburger and Ben Artzi, 2003; Mundrof and Laird, 2002) derived from the field of linguistics focuses on learning mechanisms. The cognitive approach to online literacy is not overlooked by the technological and social aspects of literacy, but the logic of this approach is that what most needs attention and development is not technical knowledge but cognitive knowledge for dealing with different dimensions of cyberspace. The cognitive approach considers all functional uses of the Internet to be based on the capabilities and

cognitive skills of users. Through the analysis of these three approaches, the social, technical and cognitive categories of Internet literacy are obtained, respectively. All of these three sorts of categories are used in our articulation of Internet literacy.

Conclusion

Our purpose to rearticulating Internet literacy in this paper is to provide a new and comprehensive approach to the Internet literacy. This approach pays attention to both all the skills mentioned in the existing approaches and the critical and analytical dimensions of Internet literacy which are especially necessary for meeting the new as well as the future dimensions of the Internet. We believe that the skills mentioned in the existing approaches and definitions of Internet literacy not only cannot help users protect their privacy, security, and also their valuable data but in many cases, these approaches hailing users as suppliers of raw data abandoned on the Internet. Such a situation both leads to the formation of “data totalitarianization” (Koran, 2014) and the loss of private data as an important asset of users. We consider such a rearticulating as a serious necessity.

Resources for achieving to our desired articulation are all the skills mentioned in the existing approaches, as well as all the skills required based on prospective approaches. We have involved all the well-known approaches to Internet literacy and its related literacies, all the famous lists of current and future skills of the Internet and all known categories of Internet literacy skills in this articulation, as well as the skills mentioned in the various definitions. This collection consists of 35 different approaches to Internet literacy and related literacies, 42 lists of internet skills, subsets of definitions or independent of them, and four well-known and popular academic classifications of Internet literacy.

A large part of the assessed skills was repetitious which we found a 52-item set of concepts after removing duplicates and integrating similar skills. The next challenge was to combine these concepts into a form that, while preserving the autonomy of concepts, could explain the relationship between these concepts in the best way. The process of classification and reaching the current structure was based on three moves from coding of subcategories to the main components and testing their validity. Another serious challenge was to find the relationship of subcategories with four main dimensions of Internet literacy, namely, analytical, critical, operational, and/or informational because many of the Internet skills belong to more than one dimension. The solution was the crossover structure design. In this way, the subcategory belonging to one or more of these four dimensions was feasible.

In the process of searching existing definitions, we faced with some claims which have expressed their particular reading of Internet literacy as the 21st-century literacy. We must declare there is no such thing as a 21st-century literacy. Such a claim is absurd, extravagant and exorbitant. The Internet is in a rapidly changing situation. In such a situation, all of our cognitive and operational knowledge about the rapidly changing phenomenon will have a degree of instability.

We cannot claim our presented model in this article is a persistent one, but it is surely a new and innovative confrontation with Internet literacy aspects which accounts not only the operational and informational aspects, but also cognitional, critical, and analytical ones. It is not just about the necessities of interactivity and productivity of Internet users, but also their ethical – moral, legal, and social responsibility.

Development of Internet literacy can affect the public demand for the Internet users' rights such as the accessibility and non-discrimination rights, freedom of expression and information rights, freedom of assembly, association and participation rights, privacy and data protection rights, education and literacy rights, protection rights, and the right to effective remedies for violations of human rights.

Users' online rights and properties are increasingly restricted or violated by governments, private companies, hackers, and other actors. In such a situation, promoting a none-critical, none-analytical, and none -responsible Internet literacy will expand the dimensions of these disasters. Thus, as developing Internet literacy can be seen as a social responsibility, rethinking the adequacy, collectivity, and harmony of this especial kind of literacy is on the line with that responsibility.

Notes

1. E-literacy is something different from electronic literacy. As Topping and Mckenna (1999) noted the term electronic literacy "refers to literacy activities that are delivered, supported, accessed, or assessed digitally through computers or other electronic means" (p. 107).

2. At the addresses below, some mostly referenced classifications and lists of skills are presented:

1. Technology literacy skills: <http://online.cune.edu/defining-technology-literacy/>
2. Cyber literacy skills: http://cybercultures.wikia.com/wiki/Definition_-_Cyberliteracy
3. Digital literacy skills: <http://www.agored.cymru/Units-and-Qualifications/Essential-Skills-Wales/Essential-Skills-for-Learners/Essential-Digital-Literacy-Skills>

4. Digital literacy skills for teachers: <https://educationstandards.nsw.edu.au/wps/wcm/connect/2de46e4e-0783-4d6e-a220-ad1e088795ac/Digital+Skills+and+Learning+Report.pdf?MOD=AJPERES&CVID=>.
5. Network literacy skills: <http://www.sqa.org.uk/sqa/files/nu/H7EA44.pdf>, <http://www.sqa.org.uk/sqa/files/nu/H7EA45.pdf>, and <http://www.sqa.org.uk/sqa/files/nu/H7EA46.pdf>
6. Network literacy skills: <http://articles.extension.org/pages/62091/what-is-network-literacy>
7. Web literacy skills: <https://mozilla.github.io/content/web-lit-whitepaper/>
8. Information Literacy Skills: <http://infolit.org/information-literacy-projects-and-programs/>
9. Information literacy skills: <https://www.cilip.org.uk/research/topics/information-literacy>
10. Data literacy skills: <http://whatis.techtarget.com/definition/data-literacy>
11. Data literacy skills: <http://dolours.edublogs.org/curriculum/>

References

- Acquisti, A.; John, L. & Loewenstein, G. (2013). What Is Privacy Worth? *The Journal of Legal Studies*, 42(2), 249-274.
- Amichai - Hamburger, Y. (2002). Internet and personality. *Computers in Human Behavior* 18: 1-10.
- Amichai - Hamburger, Y. & Ben-Artzi, E. (2003). Loneliness and Internet use. *Computers in Human Behavior* 19: 71-80.
- Association of College and Research Libraries (2000). Information Literacy Competency Standards for Higher Education. Chicago: American Library Association.
- Aufderheide, P. (1993). Media literacy: a report of the national leadership conference on media literacy. Aspen, CO: Aspen Institute.
- Banta, T. W. & Mzumara, H. R. (2004). Assessing information literacy and technological competency. *Assessment Update*, 16 (5): 3-14.
- Barbara R. & Suzanne L. (2006). Flannigan: *Connecting the Digital Dots: Literacy of the 21st Century*. Educause Quarterly, 2: 8-10.
- Bauduin, J. L.; Audouin, J.L.; Jobin, P. G. & N. Vezina, N. (2005). *Les Obligations*, 6th ed. Cowansville: Éditions Yvon Blais.
- Bhaskar, R. (1975). *A realist theory of science*. Leeds, UK: Leeds Books Ltd.
- Bukingham, D. (2007). *Beyond Technology: Children's Learning in the Age of Digital Culture*. Polity Press.
- Burks, A. W. (1978). Review: Charles S. Peirce, The new elements of mathematics, *Bulletin of the American Mathematical Society*. 84 (5): 913-918.

- Cambridge Dictionary (2017). Awareness. Retrieved April 15, 2017, online at <http://dictionary.cambridge.org/dictionary/english/awareness>
- Charmaz, K. (1990). 'Discovering' chronic illness: Using grounded theory. *Social Science & Medicine*, 30: 1161-1172.
- Charmaz, K. (2000). Constructivist and objectivist grounded theory. In N. K. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 509-535). Thousand Oaks, CA: Sage.
- Charmaz, K. (2002). Grounded theory analysis. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research* (pp. 675-694). Thousand Oaks, CA: Sage.
- Charmaz, K. (2006) *Constructing grounded theory: A practical guide through qualitative analysis*. Thousand Oaks, CA: Sage Publications, Inc.
- Charmaz, K. (2008). Constructionism and the grounded theory method. In J. A. Holstein & J. F. Gubrium (Eds.), *Handbook of constructionist research*. Guilford Press.
- Chartered Institute of Library and Information Professionals (2004). Information literacy: Definition. London: CILIP. Retrieved April 11, 2017, online from <https://www.cilip.org.uk/research/topics/information-literacy>
- Chung, A. M, Gill, I. B., & O'Byrne, I. (2017). Web Literacy 2.0. Retrieved April 10, 2017, online at <https://mozilla.github.io/content/web-lit-whitepaper/#introduction>
- Coleman, S. & Blumler, J. G. (2009). *The internet and Democratic Citizenship*. Cambridge: Cambridge University Press.
- Collins, H. (2001). *Corporate Portals: Revolutionizing Information Access to Increase Productivity and Drive the Bottom Line*. New York: AMACOM.
- Cope, B. & Kalantzis, M. (Eds.) (2000). *Multiliteracies: Literacy and the design of social futures*. London: Routledge.
- De Castell, S. & Luke, A. (1986). Models of literacy in North American schools: Social and historical conditions and consequences||. In De Castell, Suzanne; Luke, Allan; & Egan, Kieran (Eds.). *Literacy, society, and schooling*. New York: Cambridge University Press, p. 87-109.
- Denzin, N. K. & Lincoln, Y. S. (1998). *Strategies of Qualitative Inquiry*. Sage Publications.
- Eisenberg, M.B., Lowe, C.A. & Spitzer, K.L. (2004). *Information literacy: essential skills for the information age, 2nd ed*. Westport, Connecticut: Libraries Unlimited.

- Eriksson, S. & Reinsjö, A. (2016). *The Success Factors of a Technical Exhibition: A study to investigate the design aspects of an exhibition*. Master's thesis in Applied Information Technology, Department of Applied Information Technology, Chalmers University of Technology.
- Eshet-Alkalai. (2005). Thinking skills in the digital era. In: Haward, C., Bottcher, J. V., Justice, L., Schenk, K., Rogers, P. L., Berg, G. A. (eds.) (2005). *Encyclopaedia of Distance Learning, Vol. I*. London, Idea Group Inc., (pp. 1840-1845).
- Eshet-Alkalai & Amichai - Hamburger (2004). Experiments with digital literacy. *Cyber Psychology*, 7 (4): 425-434.
- Estes, J. S. (2015). A Call for Teacher Preparation Programs to Model Technology Integration into the Instructional Process. In J. Keengwe. *Handbook of Research on Educational Technology Integration and Active Learning* (p. 62-77). Hershey: IGI Global.
- Estes, J. S. (2017). Teacher Preparation Programs and Learner-Centered, Technology-Integrated Instruction. In J. Keengwe. & J. Onchwari (Editors). *Handbook of Research on Learner-Centered Pedagogy in Teacher Education and Professional Development* (p. 85-103). Hershey: IGI Global.
- Fabbro, E. (2009). Information Literacy. In P. L. Rogers, G. A. Berg, J. V. Boettcher, C. Howard, L. Justice and K. D. Schenk, *Encyclopedia of Distance Learning, Second Edition (Volume 4)* (p. 1178-1182). California: Information Science Reference.
- Farmer, L. S. J. (2011). How Adults Learn Through Information Technologies. In V. C. X. Wang. *Encyclopedia of Information Communication Technologies and Adult Education Integration* (p. 17-36). Hershey: IGI Global.
- Farmer, L. S. & Henri, J. (2008). Information literacy assessment in K-12 settings. Lanham, MD: Scarecrow Press.
- Fuji, K. & Yoshida, F. (2015). Mobile Phone-Related Behaviors and Problems in Japan. In Z. Yan. *Encyclopedia of Mobile Phone Behavior* (p. 1079-1088). Hershey: IGI Global.
- Gee, J. P. (1996). *Social linguistics and literacies*. London: Taylor & Francis.
- Gilster, P. (1997). *Digital Literacy*, New York: Wiley and Computer Publishing.
- Glaser, B. & Strauss, A. (1967). *The Discovery of Grounded Theory: strategies for qualitative research*. New York: Aldine de Gruyter Publications.
- Golian-Lui, L. M. & Westenkirchner, S. (2011). Library Issues in Adult

- Online Education. In V. C. X. Wang. *Encyclopedia of Information Communication Technologies and Adult Education Integration* (p. 485-505). Hershey: IGI Global.
- Gurak, L. J. (2003). *Cyberliteracy: Navigating the Internet with Awareness* Paperback. Yale University Press.
- Haigh, R. W. (1985). Planning for Computer Literacy. *The Journal of Higher Education*. 56 (2): 161-171.
- Halvorsen, A. (2009). Social Networking Sites and Critical Language Learning. In M. Thomas. *Handbook of Research on Web 2.0 and Second Language Learning* (p. 237-258).
- Julien, H. (2014). Digital Literacy. *Encyclopedia of Information Science and Technology*, Third Edition. IGI Global Publication.
- Kaiser Family Foundation (2003). Key Facts: Media literacy. Retrieved April 12, 2017, online at <https://kaiserfamilyfoundation.files.wordpress.com/2013/01/key-facts-media-literacy.pdf>
- Keith J Topping, K. J. & Mckenna, M. C. (1999). Introduction to Electronic Literacy – Part 1, *Reading & Writing Quarterly*, 15(2): 107-110.
- Kim, E. & Yang, S. (2016). Internet literacy and digital natives' civic engagement: Internet skill literacy or Internet information literacy?, *Journal of Youth Studies*, 19 (4): 438-456. DOI: 10.1080/13676261.2015.1083961
- Kim, E. (2011). Is Internet Literacy Inherited from Parent to Children? *Journal of Korean Society for Journalism and Communication Studies*, 55(2): 155-177.
- Klein, M. (2005). *Responsibility*. In Honderich, Ted. *Oxford Companion to Philosophy*.
- Koren, N. (2014). *An Intimate Look at the Rise of Data Totalitarianism* (reviewing Dave Eggers, *the Circle*) . Retrieved 11 10, 2015, from Cyber Law JOTWELL: <http://cyber.jotwell.com/an-intimate-look-at-the-rise-of-data-totalitarianism/>
- Leadbeater, C. (2009). *We-Think: Mass Innovation, Not Mass Production*. London: Profile Books.
- Livingstone, S. (2004). Media Literacy and the Challenge of New Information and Communication Technologies. *The communication Review*, 7:3-14.
- Livingstone, S. (2009). *Children and the Internet*. Cambridge, UK: Polity Press.
- Livingstone, S.; Bober, M. & Helsper, E. (2005). *Internet literacy among children and young people: Findings from the UK children Go Online project*. London: London School of Economics and Political Science.

- Martin, A. & Grudziecki, J. (2006). DigEuLit: concepts and tools for digital literacy development. *ITALICS*, 5(4): 249-267.
- Mascheroni, G. (2013). Performing Citizenship Online: Identity, Subactivism and Participation. *Observatorio Journal*, 7 (3): 093-119.
- McCallin, A. (2004). Pluralistic Dialoguing: A theory of interdisciplinary team working, *The Grounded Theory Review*, 4(1): 25-42.
- Michael, S. (2016). Privates in the online public: Sex(ting) and reputation on social media. *New Media & Society*, 2016, 18(11), pp.2723-2739.
- Müller, A. R., Röder, M., & Fingerle, M. (2014). Child sexual abuse prevention goes online: Introducing “Cool and Safe” and its effects. *Computers & Education* 78 (2014) 60-65.
- Mundrof, N. & Laird, K. R. (2002). Social and psychological effects of information technologies and other interactive media. In J. Bryant, & D. Zillman (eds), *Media Effects: Advances in Theory and Research* (2nd ed.) (231-255). Mahwah, NJ: Erlbaum.
- Murru, M. F., (2013), The intersection between “obvious” and “catalyzed public” through the mediating domain of civic cultures, *Comunicação & Sociedade*, 23: 170 - 185.
- Na, L. & Yan, Z. (2013). Promote Data-intensive Scientific Discovery, Enhance Scientific and Technological Innovation Capability: New Model, New Method, and New Challenges Comments on The Fourth Paradigm: Data-intensive Scientific Discovery. *Bulletin of Chinese Academy of Sciences*. 1 (16).
- National Forum on Information Literacy (2017). What is the NFIL? Retrieved April 02, 2017 online at <http://infolit.org/about-the-nfil/what-is-the-nfil/>
- NetSciEd (2017). Network Literacy: Essential Concepts and Core Ideas. Retrieved April 07, 2017 online from <https://sites.google.com/a/binghamton.edu/netscied/teaching-learning/network-concepts>
- Nicholas, H. & Ng, W. (2009). Ubiquitous Learning and Handhelds. In P. L. Rogers, G. A. Berg, J. V. Boettcher, C. Howard, L. Justice and K. D. Schenk, *Encyclopedia of Distance Learning, Second Edition (Volume 4)* (p. 2171-2176). California: Information Science Reference.
- Oxford Dictionary (2017). Productivity. Retrieved April 16, 2017, online from <https://en.oxforddictionaries.com/definition/productivity>
- Parker, J. D. A.; Taylor, R. N.; Eastabrook, J. M.; Schell, S. L. & Wood, L. M. (2008). Problem gambling in adolescence: Relationships with Internet misuse, gaming abuse, and emotional intelligence. *Personality and Individual Differences*, 45 (2): 174-180.
- Potter, W. J. (2010). The state of media literacy. *Journal of Broadcasting & Electronic Media* 54: 675-696.

- Prasad, L. & Gulshan. S. S. (2011). *Management Principles and Practices*. New Delhi: Excel Books.
- Rafaeli, S. (1988). Interactivity: From new media to communication. In R. P. Hawkins, J. M. Wiemann, & S. Pingree (Eds.), *Sage Annual Review of Communication Research: Advancing Communication Science: Merging Mass and Interpersonal Processes*, 16, 110-134. Beverly Hills: Sage. Haifa.ac.il.
- Rouse, M. & Wigmore, I. (2015). Definition data literacy. Retrieved April 13, 2017, online at <http://whatis.techtarget.com/definition/data-literacy>
- Rubin, P. H. & Lenard, T. M. (2002). *Privacy and the Commercial Use of Personal Information*. Washington, D.C.: Progress and Freedom Foundation.
- Scottish Qualifications Authority (2014). National Unit specification: Network literacy. Retrieved April 10, 2017, online from <http://www.sqa.org.uk/sqa/files/nu/H7EA44.pdf>
- Sedivy-Benton, A. L. (2016). Individual Differences, Learning Opportunities and Learning Outcomes, Digital Equity: Bridging the Gap – Creating Learning Opportunities for All Students. In V. C. X. Wang. *Handbook of Research on Learning Outcomes and Opportunities in the Digital Age* (p. 266-286). Hershey: IGI Global.
- SETDA (2007). 2007 Technology Literacy Assessment and Educational Technology Standards Report. Retrieved April 07, 2017 online at www.setda.org/wp-content/uploads/2015/03/TEchnologyLiteracy2007Final.pdf
- The American Heritage Dictionary (2000). (4th College edition). Boston: Houghton Mifflin.
- Theodore Schneyer, "Professionalism as Politics: The Making of a Modern Legal Ethics Code," in *Lawyers' Ideals/Lawyers' Practices: Transformations in the American Legal Profession*, eds. Robert L. Nelson, David M. Trubek, & Rayman L. Solomon, 95-143 (Ithaca: Cornell University Press, 1992), 104.
- Tobin, C. D. (1983). Developing Computer Literacy. *The Arithmetic Teacher*. 30 (6): 22-23.
- Tyner, K. R. (1998). *Literacy in a Digital World: Teaching and Learning in the Age of Information*. Hillsdale, NJ: L. Erlbaum Associates.
- Van Deursen, A. & Van Dijk, J. (2011). Internet Skills and the Digital Divide. *New Media & Society* 13(6): 893-911.
- Vanwynsberghe, H.; Boudry, E. & Verdegem, P. (2011). *Mapping Social Media Literacy: Towards a Conceptual Framework*. Brussels: EMSOC.

- Willig, C. (2013). *Introducing Qualitative Research in Psychology*. London: McGraw-Hill Education.
- Yuping, L, & Shrum, L. J. (2002). What is Interactivity and is it always Such a Good Thing? Implications of Definition, Person, and Situation for the Influence of Interactivity on Advertising Effectiveness, *Journal of Advertising*, 31(4): 53-64.